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## ON THE STRUCTURE OF THE FORE FOOT OF DIMETRODON.

DURING the summer of 1903, while in charge of the University of Chicago expedition in the Permian fossil fields of Texas, the author collected the right fore leg and foot of a Pelycosaurian reptile of the genus *Dimetrodon*. The species is not determinable at present, but is very close to *Dimetrodon incisivus*, if not that species exactly. When found the bones were badly softened by decay, but after cleaning and hardening I find that those of the carpus, with one exception, are perfectly preserved and in their natural positions. This is particularly fortunate, as it is the exception to find any considerable portion of a skeleton together in the Texas fields.

The author has previously described<sup>1</sup> an imperfect front foot of *Dimetrodon*, No. 114 of the University of Chicago collection, and attempted to place the bones in their natural relations. The present specimen shows that the position of the bones in the figure was erroneous and must be corrected.

Fig. 1 shows the right front foot from the lower surface. The bones added from another specimen are in line only. The specimen has received the number 1003 in the University of Chicago collection of vertebrate fossils.

A study of the specimen brings out first of all the striking resemblance of the foot to the foot of *Sphenodon* (Fig. 2), not only in the number of the bones, but in the arrangement and to some extent the form. This emphasizes the Rynchocephalian nature of the Pelycosaurs already demonstrated from the structure of the skull.

The carpus consists of eleven elements. The ulnare is a stout bone with wide proximal end, and resembles the same bone in *Sphenodon* very closely. The radiale is larger than the ulnare, but is not so stout; it is very thin, but elongate and articulates with the distal row of carpals. The intermedium reaches well up between the radius and ulna. There are two centrale. Centrale 1 occupies a central

<sup>1</sup> JOURNAL OF GEOLOGY, Vol. XI, No. 1 (1903), p. 11.

position in the carpus and is much larger than the second. Centrale 2 lies between the ulnare and the third, fourth, and fifth carpals, but is surrounded by bones, as its outer side articulates with the sesamoid. The form and articulation of the five carpals of the distal row are best

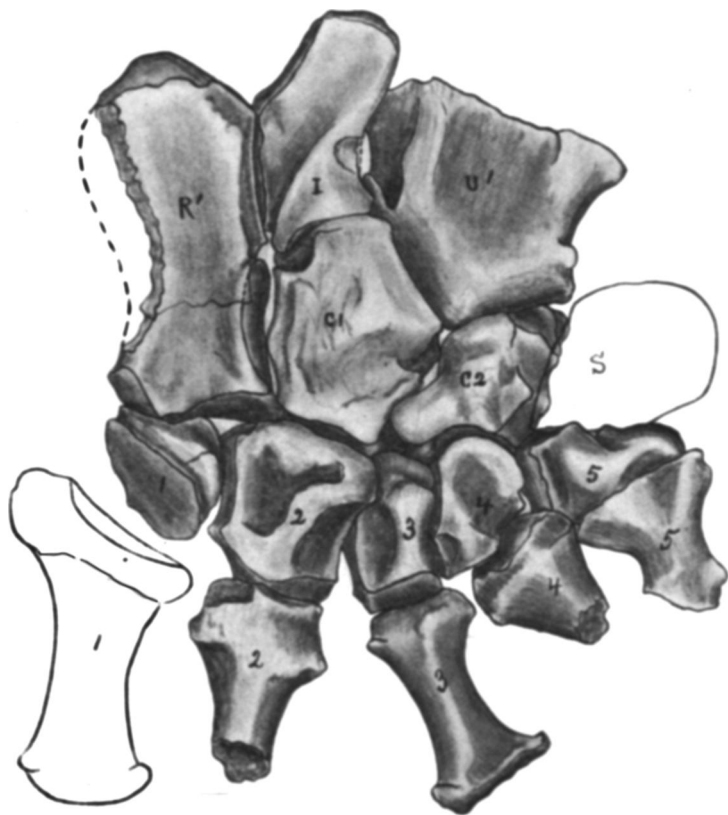


FIG. 1.—Lower side of the manus of the right foot of *Dimetrodon* sp. *r'*, radiale; *u'*, ulnare; *i*, intermedium; *c* 1, centrale one; *c* 2, centrale two; *s*, sesamoid; 1, 2, 3, 4, 5, carpals and metacarpals. Natural size.

seen from the figure. The fifth carpal is peculiar in its prominent position at the side of the carpus, standing well away from the rest of the bones.

A second specimen of *Dimetrodon* discovered the same summer afforded a nearly complete anterior portion of the skeleton. It has received the number 1001 in the Chicago collection. The bones of

this specimen were somewhat scattered, so that, although the bones of the fore legs and feet were preserved, they were not in position. From the specimen 1003 the bones of the carpus of both sides in specimen 1001 have been placed in position, and both show the presence

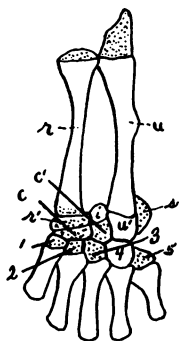


FIG. 2.—Upperside left manus of *Sphenodon* after Bayer and Howse, from Osborn. Lettering as in Fig. 1. Natural size.

of an extra element which, from the position of articular surfaces and from comparison with *Sphenodon*, evidently occupies the position of the pisiform bone on the ulnar side of the mammalian carpus. It is a sesamoid bone of considerable size.

The bones of the carpus fit snugly together, with well-developed articular surfaces, making a strong foot. This is also shown by the possession of well-developed phalanges and powerful claws.

The first digit was shorter and stouter than the second. The broad proximal end is characteristic of the first metacarpal. The second digit was probably the largest of the foot, judging from the length of the metacarpal and the imperfect foot of specimen 114. The third and fourth metacarpals are more slender than the second. The fifth metacarpal is a very broad and thin bone articulated to the prominent fifth carpal, so that it stood out from the others at a considerable angle. The articular surface between the fifth carpal and metacarpal is twisted in a peculiar manner, so that it permits of a considerable range of motion. This perhaps explains the fact that the fifth metacarpal and digit were found in the specimen 114 lying at right angles to the fourth. In the description and figure of 114 they were called first and second.



FIG. 3.—Manus of *Procolophon*. From Osborn after Broom. Lettering as in Fig. 1. Natural size.

It is interesting to compare the carpus of *Dimetrodon* with the carpus of *Procolophon* in the light of Broom's determination of the *Rhynchocephalian* nature of *Procolophon*.<sup>1</sup> Fig. 3 is an outline

<sup>1</sup> BROOM, *Records of the Albany Museum*, Vol. I, No. 1 (1903). See also OSBORN, *Memoirs of the American Museum of Natural History*, Vol. I, No. 8 (1903), p. 480.

drawing of Broom's restoration, slightly modified according to Osborn; *i. e.*, the bone marked centrale 2 was called by Broom radiale. It will be seen that the carpus is essentially the same if the radiale is restored. The fifth carpal is missing, but that may well be left open for future evidence, as there is so commonly a fifth carpal in the primitive reptiles.

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